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10/761,073

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EXAMINER

CAMPOS, YAIMA

ART UNIT

PAPER NUMBER

2185

DATE MAILED: 10/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-------------------------------|-------------------------------|--|
| Office Action Summary | Application No. 10/761,073 | Applicant(s) STEELY ET AL. | |
| | Examiner Yaima Campos | Art Unit 2185 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>1/20/04</u> . | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

1. The instant application having Application No. 10/761,073 has a total of 40 claims pending in the application; there are 7 independent claims and 33 dependent claims, all of which are ready for examination by the examiner.

I. INFORMATION CONCERNING OATH/DECLARATION

Oath/Declaration

2. The applicant's oath/declaration has been reviewed by the examiner and is found to conform to the requirements prescribed in 37 C.F.R. 1.63.

II. INFORMATION CONCERNING DRAWINGS

Drawings

3. The applicant's drawings submitted are acceptable for examination purposes.

III. ACKNOWLEDGEMENT OF REFERENCES CITED BY APPLICANT

4. As required by M.P.E.P. 609(C), the applicant's submission of the Information Disclosure Statement dated January 20, 2004 is acknowledged by the examiner and the cited references have been considered in the examination of the claims now pending. As required by M.P.E.P 609 C(2), a copy of the PTOL-1449 initialed and dated by the examiner is attached to the instant office action.

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IV. OBJECTIONS TO THE SPECIFICATION

5. The disclosure is objected to because of the following informalities:
6. The Application numbers for the commonly assigned co-pending Applications listed in the Specification should be updated to replace the attorney docket numbers.

Appropriate correction is required.

V. REJECTIONS BASED ON PRIOR ART

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. **Claims 1-9, 12-14, 16-22, 25-29, 31-37 and 39-40** are rejected under 35

U.S.C. 102(b) as being anticipated by Arimilli et al. (US 2002/0129211).

9. As per **claim 1**, Arimilli discloses

A system comprising:

“a first node that provides a source broadcast request for data, the first node being operable to respond in a first manner to other source broadcast requests for the data while the source broadcast request for the data is pending at the first node;” as [**“a plurality of agents coupled to an interconnect...in response to snooping the transaction, a second agent provides a snoop response indicating that the second agent has a pending conflict store request” and explains that “master 26 prevents access to the target cache line by other agents 10 by means of appropriate snoop responses until**

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the store into cache array 24 is completed” (Pages 1-2, Paragraph 0012; Page 4, Paragraphs 0035-0038)]

“the first node being operable to respond in a second manner to the other source broadcast requests for the data in response to receiving an ownership data response at the first node” **[With respect to this limitation, Arimilli discloses “and a coherency decision point provides a snoop response granting the first agent ownership of the data” (Pages 1-2, Paragraph 0012; Page 4, Paragraphs 0035-0038)].**

10. As per claim 2, Arimilli discloses the system of claim 1, **[See rejection to claim 1 above]** “wherein the ownership data response comprises an indication to the first node that the data associated with the ownership data response comprises migratory data” **[Arimilli discloses this concept as “master receives a store request from processor 16... master 26 sets its Dclaim pending flag and initiates a Dclaim transaction on system bus 12 to obtain ownership of the target cache line from the CDP” wherein “a shared state (defined herein as any state indicating that identical data may be held in another cache14)” (Figure 3A; Page 4, Paragraphs 0035-0036)].**

11. As per claims 3 and 4, Arimilli discloses the system of claim 2, **[See rejection to claim 2 above]** “wherein the migratory data comprises a cache ordering point for serializing source broadcast requests for the data, the cache ordering point migrating to the first node from a node that provides the ownership data response” **[Arimilli discloses this concept as “in addition, to maintain coherency, master 26 performs clean-up operations to invalidate other (now stale) copies of the target cache line, if any, held by other agents 10, and further, to ensure that the associated snoop 28 provides snoop responses informing masters 26, if any, that lost the arbitration to downgrade**

their Dclaim transactions to RWITM transactions... while master 26 is issuing these Kill transactions, the associated snoop 28 provides NACK snoop responses to Dclaim transactions of losing masters 26 that did not receive a NACK snoop response” (Page 4, Paragraph 0038; Table I)].

12. As per **claim 5**, Arimilli discloses the system of claim 1, [See rejection to claim 1 above] wherein “the source broadcast request from the first node comprises a source broadcast read request, the first node, when responding in the first manner, provides a first response to the other source broadcast requests for the data indicating that the first node has a conflicting read request for the data” [Arimilli discloses this concept as “coordination of accesses satisfied by multiple possible data sources to ensure that read and write accesses to each system memory address are ordered such that agents requesting read access receive correct data” (Page 1, Paragraph 0005) and explains that “master 26 prevents access to the target cache line by other agents 10 by means of appropriate snoop responses until the store into cache array 24 is completed” wherein “a master intends to modify a shared cache line held in its associated cache and that the other agents should invalidate their cached copies of the cache line... master 26 performs clean-up operations to invalidate other (now stale) copies of the target cache line held by other agents 10” (Pages 1-2, Paragraph 0012; Page 4, Paragraphs 0035-0038)].

13. As per **claim 6**, Arimilli discloses the system of claim 5, [See rejection to claim 5 above] further comprising “a second node that provides one of the other source broadcast requests for the data and receives the first response from the first node, the second node being operative to fill a shared copy of data received from a third node in

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response to the one of the other source broadcast requests for the data” [With respect to this limitation, Arimilli discloses having “agents 10” (Figure 1) and explains that “the first agent is permitted to modify data. To maintain coherency, the first agent also invalidates other cached copies of the data, if any” (Pages 1-2, Paragraph 0012) wherein a single-owner may modify a cache line at a time (Page 2, Paragraph 0024) wherein “a conflict arises if during interval 160, the master 26 of a second agent 10 (and possibly one or more agents 10) develops, or has previously developed and manifests, at any time during interval 160 an intention to modify the target cache line” (Page 3, Paragraph 0029)].

14. As per claim 7, Arimilli discloses the system of claim 5, [See rejection to claim 5 above] further comprising “a second node that provides one of the other source broadcast requests for the data and receives the first response from the first node, the second node being operative to fill a copy of data received from a home node for the data” [The rationale in the rejection of claim 6 is incorporated herein].

15. As per claim 8, Arimilli discloses the system of claim 1, [See rejection to claim 1 above] wherein “the first node, when responding in the second manner, provides a second response to the other source broadcast requests for the data indicating that the source broadcast request from the first node is a conflicting request for the data and that migration of the data to the first node is in progress” [With respect to this limitation, Arimilli discloses “response logic 30 combines the snoop response of the CDP with the snoop responses of the other agents 10 to produce a combined response. In the case of multiple conflicting requests shown in FIG. 2, the combined response informs an agent 10 that issued a transaction whether or not it won the arbitration

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performed by the CDP and is the new owner of the target cache line... the granting CDP protects ownership of target cache line by providing snoop responses denying ownership to other agents that issue conflicting responses” (Pages 3-4, Paragraphs 0032-0033) and explains that “master 26 prevents access to the target cache line by other agents 10 by means of appropriate snoop responses until the store into the cache array 24 is completed” (Page 4, Paragraph 0036)].

16. As per claim 9, Arimilli discloses the system of claim 8, [See rejection to claim 8 above] further comprising “a second node that provides one of the other source broadcast requests for the data and receives the second response from the first node, the second node being operative to employ a copy of the data received from a third node for only a single use” [Arimilli discloses this concept as “coherency protocols typically require that only a single agent can own each line at any given time for purposes of modification” (Page 3, Paragraph 0033)].

17. As per claims 12 and 17, Arimilli discloses the system of claims 1 and 16, [See rejection to claim 1 above and rejection to claim 16 bellow] wherein “the first node employs an invalidate line command to other nodes of the system to remove incorrect copies of the data and any stale copies of the data cached at the other nodes of the system” [Arimilli discloses this limitation as “to maintain coherency, master 26 performs clean-up operations to invalidate other (now stale) copies of the target cache line, if any, held by other agents 10... master 26 invalidates other copies of the target cache line by issuing high-priority Kill transactions on system bus 12 until all other agents provide Null snoop responses indicating that other copies of the cache line have been invalidated” (Page 4, Paragraph 0038)].

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18. As per **claim 13**, Arimilli discloses the system of claim 1, [See rejection to claim 1 above] wherein the source broadcast request provided by the first node is broadcast using a source broadcast cache coherency protocol [Arimilli discloses this concept as **agents snoop to use resources (Pages 1-2, Paragraphs 0011-0012; Figure 4)**].

19. As per **claim 14**, Arimilli discloses the system of claim 1, [See rejection to claim 1 above] wherein “the first node defines a processor having an associated cache, the associated cache of the processor comprising a plurality of cache lines, each cache line having a respective tag address that identifies associated data and each cache line having state information that indicates a state of the associated data for the respective cache line,” [With respect to this limitation, Arimilli discloses cache lines having tag fields (Pages 2-3, Paragraphs 0023 and 0025; Figure 1)]

“the processor being capable of communicating with other nodes of the system through an interconnect,” [Arimilli discloses this limitation as “a plurality of agents coupled to an interconnect” (Page 1, Paragraph 0012; Figure 1)]

“the system further comprising a cache controller associated with the processor, the cache controller being operative to manage data requests and responses for the associated cache of the processor, the cache controller effecting state transitions associated with the data in the associated cache of the processor based on the data requests and responses for the associated cache of the processor” [Arimilli discloses this limitation as “master 26” and “snooper 28” (Pages 2-3; Paragraphs 0024-0026; Figure 1) wherein “in addition, to maintain coherency, master 26 performs clean-up operations to invalidate other (now stale) copies of the target cache line, if any, held by other agents” and explains that “while master 26 is issuing these Kill transactions, the

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associated snoopers 28 provides NACK snoop responses to Dclaim transactions of losing masters 26 that did not receive an NACK snoop response” (Page 4, Paragraph 0038)].

20. As per claim 16, Arimilli discloses

A multi-processor network comprising: as [“**data processing system 8” (Figure 1)] “a source processor node that provides a source broadcast read request for data; the source processor node issuing an invalidate line command to other processor nodes of the system in response to receiving a data response that transfers a cache ordering point for the data to the source processor node” [Arimilli discloses this concept as “a plurality of agents coupled to an interconnect...in response to snooping the transaction, a second agent provides a snoop response indicating that the second agent has a pending conflict store request” and explains that “master 26 prevents access to the target cache line by other agents 10 by means of appropriate snoop responses until the store into cache array 24 is completed” (Pages 1-2, Paragraph 0012; Page 4, Paragraphs 0035-0038) and explains “and a coherency decision point provides a snoop response granting the first agent ownership of the data” (Pages 1-2, Paragraph 0012; Page 4, Paragraphs 0035-0038) wherein “a conflict arises if, during interval 160, the master 26 of a second agent 10 (and possibly one or more additional agents 10) develops, or has previously developed and manifests at any time during interval 160 an intention to modify the target cache line” (Page 3, Paragraph 0029) “master 26 invalidates other copies of the target cache line by issuing high-priority Kill transactions... while master 26 is issuing these Kill transactions, the associated snoopers 28 provides NACK snoop responses to Dclaim**

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transactions of losing masters 26 that did not receive an NACK snoop response”

(Page 4, Paragraph 0038)].

21. As per claims 18 and 26, Arimilli discloses the multi-processor network of claim 16, [See rejection to claim 16 above] wherein “the source processor node is operative to provide a first conflict response to source broadcast requests for the data from the other processor nodes prior to receiving the data response that transfers the cache ordering point for the data to the source processor node, the source processor node being operative to provide a second conflict response to at least one source broadcast request for the data from at least one of the other processor nodes in response to the source processor node receiving a conflict response and receiving the data response that transfers the cache ordering point for the data to the source processor node” [Arimilli discloses this concept as “a plurality of agents coupled to an interconnect...in response to snooping the transaction, a second agent provides a snoop response indicating that the second agent has a pending conflict store request” and explains that “master 26 prevents access to the target cache line by other agents 10 by means of appropriate snoop responses until the store into cache array 24 is completed” (Pages 1-2, Paragraph 0012; Page 4, Paragraphs 0035-0038) and explains “and a coherency decision point provides a snoop response granting the first agent ownership of the data” (Pages 1-2, Paragraph 0012; Page 4, Paragraphs 0035-0038) wherein “a conflict arises if, during interval 160, the master 26 of a second agent 10 (and possibly one or more additional agents 10) develops, or has previously developed and manifests at any time during interval 160 an intention to modify the target cache line” (Page 3, Paragraph 0029) “master 26 invalidates other copies of the target cache line by

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issuing high-priority Kill transactions... while master 26 is issuing these Kill transactions, the associated snoop 28 provides NACK snoop responses to Dclaim transactions of losing masters 26 that did not receive an NACK snoop response” (Page 4, Paragraph 0038)].

22. As per claim 19, Arimilli discloses the system of claim 18, [See rejection to **claim 18 above**] wherein “the source processor node provides the first response to the source broadcast requests for the data from the other processor nodes when the source processor node has a pending conflicting read request for the data” [The rationale of **claim 5 is herein incorporated**].

23. As per claims 20 and 27-28, Arimilli discloses the system of claim 19, [See rejection to **claim 19 above**] wherein “the other processor nodes receiving the first response from the source processor node are operative to fill a copy of the data received from at least one of the other processor nodes and from system memory” [The rationale of **claim 6 is herein incorporated**].

24. As per claim 21, Arimilli discloses the system of claim 18, [See rejection to **claim 18 above**] wherein “the source processor node provides the second response to the source processor node receiving a request for the data that conflicts with the source broadcast request for the data after migration of the data to the source processor node has begun” [Arimilli discloses this concept as “while master 26 is issuing these Kill transactions, the associated snoop 28 provides NACK snoop responses to Dclaim transactions of losing masters 26 that did not receive an NACK snoop response during interval 12” (Page 4, Paragraph 0038)].

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25. As per **claims 22 and 29**, Arimilli discloses the system of claim 21, [See **rejection to claim 21 above**] wherein “one of the other processor nodes comprises a second processor node that provides a respective one of the other source broadcast requests for the data and receives the second response from the first node, the second processor node being operative to employ a copy of the data received from a third node for a single use” [The rationale of claim 9 is herein incorporated].

26. As per **claim 25**, Arimilli discloses “A system comprising: means for broadcasting a source broadcast request for data from a first node; and means for issuing from the first node an invalidate line command to other nodes of the system in response to receiving a conflict response from at least one other node in the system and a data response transferring a cache ordering point for the data to the first node” [The rationale in the rejection of claim 16 is herein incorporated].

27. As per **claim 31**, Arimilli discloses “A system comprising: means for broadcasting a source broadcast request for data from a first node; means for providing a first conflict response to other source broadcast requests for the data from other nodes while the source broadcast for the data is pending at the first node; and means for providing a second conflict response to the other source broadcast requests for the data from the other nodes after receiving an ownership data response at the first node while the source broadcast for the data is pending at the first node” [The rationale in the rejection of claim 1 is herein incorporated. Arimilli further explains that “a conflict arises if, during interval 160, the master 26 of a second agent 10 (and possibly one or more additional agents 10) develops, or has previously developed and manifests at any time during interval 160 an intention to modify the target cache line” (Page 3,

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Paragraph 0029) “master 26 invalidates other copies of the target cache line by issuing high-priority Kill transactions... while master 26 is issuing these Kill transactions, the associated snoop 28 provides NACK snoop responses to Dclaim transactions of losing masters 26 that did not receive an NACK snoop response” (Page 4, Paragraph 0038)].

28. As per **claim 32**, Arimilli discloses the system of claim 31, [See rejection to **claim 31 above**] further comprising “means for cleaning-up incorrect copies of the data and stale copies of the data filled at other nodes of the system in response to receiving the ownership data response at the first node” [With respect to this limitation, Arimilli discloses “**master 26 must perform clean-up operations to ensure coherency**” (Page 7, Paragraphs 0038 and 0058)].

29. As per **claim 33**, Arimilli discloses the system of claim 31, [See rejection to **claim 31 above**] further comprising “means for issuing an invalidate line command to the other nodes of the system in response to receiving the ownership data response at the first node” [With respect to this limitation, Arimilli discloses “**master 26 invalidates other copies of the target cache line by issuing high-priority Kill transactions**” (Page 4, Paragraph 0038)].

30. As per **claim 34**, Arimilli discloses “A method comprising: migrating a cache ordering point for a line of data from a first node of a system to a second node of a system; and issuing an invalidate line command for the line of data from the second node to other nodes of the system in response to receiving a conflict response from at least one other node in the system and to the cache ordering point migrating from the first node to the second node” [The rationale of claim 1 is herein incorporated. Arimilli further

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discloses “a conflict arises if, during interval 160, the master 26 of a second agent 10 (and possibly one or more additional agents 10) develops, or has previously developed and manifests at any time during interval 160 an intention to modify the target cache line” (Page 3, Paragraph 0029) “master 26 invalidates other copies of the target cache line by issuing high-priority Kill transactions... while master 26 is issuing these Kill transactions, the associated snoop 28 provides NACK snoop responses to Dclaim transactions of losing masters 26 that did not receive an NACK snoop response” (Page 4, Paragraph 0038)].

31. As per claim 35, Arimilli discloses the method of claim 34, [See rejection to **claim 34 above**] further comprising: “providing a first conflict response from the second node to requests for the line of data from the other nodes of the system prior to the cache ordering point migrating from the first node to the second node; and providing a second conflict response from the second node to requests for the line of data from the other nodes after the cache ordering point migrates from the first node to the second node” [The rationale of claim 18 is herein incorporated].

32. As per claim 36, Arimilli discloses the method of claim 35, [See rejection to **claim 35 above**] further comprising: “enabling a shared copy of the line of data to be filled at one of the other nodes of the system in response to receiving the first conflict response from the second node and a data response from at least another node of the system; and enabling a copy of the line of data received from system memory to be filled at one of the other nodes of the system in response to receiving the first conflict response from the second node” [Arimilli discloses this concept as “data associated with a target address are cached at a first agent among the plurality of agents in a shared

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state... a coherency decision point provides a snoop response granting the first agent ownership of the data... the first agent is permitted to modify the data... to maintain coherency, the first agent also invalidates other cached copies of the data... the coherency decision point at the first agent preferably protect the first agent's ownership of the data by providing appropriate snoop responses to conflicting transactions" (Pages 1-2, Paragraphs 0012-0013)].

33. As per **claim 37**, Arimilli discloses the method of claim 35, [See rejection to **claim 35 above**] further comprising "enabling a shared copy of the line of data to be filled at least one of the other nodes of the system for a single use by the at least one of the other nodes of the system in response to receiving the second conflict response from the first node" [The rationale of claim 9 is herein incorporated].

34. As per **claim 39**, Arimilli discloses "A method comprising: providing a first conflict response from a first node to source broadcast requests for data from other nodes while a source broadcast request for the data is pending at the first node; and providing a second conflict response from the first node to the other source broadcast requests for the data from the other nodes in response to receiving a conflict response and an ownership data response at the first node" [The rationale of claim 31 is herein incorporated].

35. As per **claim 40**, Arimilli discloses "A computer system comprising a plurality of nodes, the plurality of nodes employing a cache coherency protocol operative to migrate a cache ordering point for a line of data from a target node to a source node in response to a source broadcast read request for the line of data issued by the source node, the source node being operative to invalidate the line of data at other nodes of the computer system

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in response to receiving a conflict response and migratory data to the source broadcast read request” [The rationale of claim 34 is herein incorporated].

Claim Rejections - 35 USC § 103

36. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

37. **Claims 10-11, 23-24, 30 and 38** are rejected under 35 U.S.C. 103(a) as being unpatentable over Arimilli et al. (US 20020129211) in view of Arimilli et al. (US 6,138,218).

38. As per **claims 10, 23, 30 and 38**, Arimilli discloses the system of claims 8, 21, 26 and 35 [See rejection to claims 8, 21, 26 and 35 above] further comprising “a second node that provides one of the other source broadcast requests for the data and receives the second response from the first node,” as [Arimilli discloses this concept as “if snooper 28 determines that the target cache line is invalid in cache directory 22 and that the Dclaim pending flag of the associated master 26 is set, snooper 28 belongs to an agent 10 whose master 26 lost arbitration for ownership of the target cache line... snooper 28 therefore provides a RETRY SR” (Page 5, Paragraphs 0043-0045)]

Arimilli (US 2002/0129211) does not disclose expressly “the second node being operative to employ a forward progress technique to obtain the data.”

Arimilli (US 6,138,218) discloses “the second node being operative to employ a forward progress technique to obtain the data” [Column 6, lines 39-45 and 54-64].

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Arimilli et al. (US 2002/0129211) and Arimilli et al. (US 6,138,218) are analogous art because they are from the same field of endeavor of computer memory access and control.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify the multiprocessor memory system that provides broadcast/snoops requests to maintain data coherency as taught by Arimilli (US 2002/0129211) and further employ a forward progress technique to obtain the data when broadcasts/snooping are not successful as taught by Arimilli (US 6,138,218).

The motivation for doing so would have been because Arimilli (US 6,138,218) discloses employing a forward process technique to resolve the transaction if the source broadcast/snooping protocol cannot provide a deterministic resolution of the transaction **[(Column 6, lines 39-45 and 54-64)]** to obviate the need for subsequent interventions or snoop/broadcast retries **[(Column 6, lines 48-50)]**.

Therefore, it would have been obvious to combine Arimilli et al. (US 6,138,218) with Arimilli et al. (US 2002/0129211) for the benefit of creating a memory system to obtain the invention as specified in claims 10, 23, 30 and 38.

39. As per **claims 11 and 24**, the combination of Arimilli (US 2002/0129211) and Arimilli et al. (US 6,138,218) discloses the system of claims 10 and 23, **[See rejection to claims 10 and 23 above]** wherein “the forward progress technique comprises a forward progress cache coherency protocol” **[The rationale in the rejection of claim 10 is herein incorporated]**.

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40. **Claim 15** is rejected under 35 U.S.C. 103(a) as being unpatentable over Arimilli et al. (US 2002/0129211) in view of Arimilli et al. (US 6,138,218) and Martin et al. (US 6,883,070).

41. As per **claim 15**, Arimilli (US 20020129211) discloses the system of claim 1, **[See rejection to claim 1 above; the rationale of claim 1 is herein incorporated]** wherein “the first node employs a source broadcast-based protocol to issue the source broadcast request for the data,” **[Arimilli (US 20020129211) discloses this concept as agents snoop to use resources (Pages 1-2, Paragraphs 0011-0012; Figure 4)]** but does not disclose expressly implementing “a hybrid cache coherency protocol the first node employing an associated forward progress protocol to reissue a request for the data in response to the request failing in the source broadcast protocol.”

Arimilli (US 6,138,218) discloses “the second node being operative to employ a forward progress technique to obtain the data to reissue a request for the data in response to the request failing in the source broadcast protocol” **[Column 6, lines 39-45 and 54-64]** but does not disclose expressly using a hybrid cache coherency protocol.

Martin discloses a multi-processor system comprising at least one node that employs a hybrid coherency protocol, the hybrid coherency protocol employing a forward progress protocol to resolve the transaction **[(Abstract; Column 1, lines 38-50)]**.

Arimilli et al. (US 2002/0129211), Arimilli et al. (US 6,138,218) and Martin et al. (U 6,883,070) are analogous art because they are from the same field of endeavor of computer memory access and control.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify the multiprocessor memory system that provides broadcast/snoops requests to maintain data coherency as taught by Arimilli (US 2002/0129211); employ a forward progress technique to obtain the data when broadcasts/snooping are not successful as taught by Arimilli (US 6,138,218) and further use a hybrid cache coherency protocol as taught by Martin.

The motivation for doing so would have been because Arimilli (US 6,138,218) discloses employing a forward process technique to resolve the transaction if the source broadcast/snooping protocol cannot provide a deterministic resolution of the transaction **[(Column 6, lines 39-45 and 54-64)]** to obviate the need for subsequent interventions or snoop/broadcast retries **[(Column 6, lines 48-50)]** and Martin discloses **[using a hybrid coherency protocol employing a forward process protocol to provide a hybrid protocol that is sensitive to the bandwidth available for communication of cache protocol messages (Column 2, lines 27-30)]**.

Therefore, it would have been obvious to combine Martin et al. (US 6,883,070), Arimilli et al. (US 6,138,218) with Arimilli et al. (US 2002/0129211) for the benefit of creating a memory system to obtain the invention as specified in claim 15.

VI. RELEVANT ART CITED BY THE EXAMINER

42. The following prior art made of record and not relied upon is cited to establish the level of skill in the applicant's art and those arts considered reasonably pertinent to applicant's disclosure. See **MPEP 707.05(c)**.

Art Unit: 2185

43. The following references teaches maintaining coherency among different agents wherein the first node is configured to fetch the coherency block from another node and the other node records a state in which the coherency block is provided to the first node.

U.S. PATENT NUMBER

US 2003/0217236

44. The following reference teaches a shared memory multiprocessing system employing mixed broadcast snooping and director based coherency protocols.

U.S. PATENT NUMBER

US 2003/0018739

45. The following reference teaches non-speculative conflict resolution for a cache coherency protocol in which acknowledgement messages allow conflicting nodes to be aware of conflicts in which they are involved.

U.S. PATENT NUMBER

US 2004/0123052

VII. CLOSING COMMENTS

Conclusion

a. STATUS OF CLAIMS IN THE APPLICATION

46. The following is a summary of the treatment and status of all claims in the application as recommended by M.P.E.P. 707.07(i):

a(1) CLAIMS REJECTED IN THE APPLICATION

47. Per the instant office action, claims 1-40 have received a first action on the merits and are subject of a first action non-final.

Art Unit: 2185

b. DIRECTION OF FUTURE CORRESPONDENCES

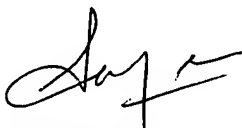
48. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yaima Campos whose telephone number is (571) 272-1232. The examiner can normally be reached on Monday to Friday 8:30 AM to 5:00 PM.

IMPORTANT NOTE

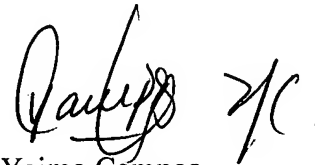
49. If attempts to reach the above noted Examiner by telephone are unsuccessful, the Examiner's supervisor, Mr. Sanjiv Shah, can be reached at the following telephone number: Area Code (571) 272-4098.

The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

September 19, 2006



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SUPERVISORY PATENT EXAMINER
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Yaima Campos
Examiner
Art Unit 2185